

Examining Technical Efficiency of NBFI-MFIs in India: A Non-parametric Approach

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Abstract

This study analyses the technical efficiency of Non-Banking Financial Institution – Micro Finance Institutions (NBFI-MFIs) in India under both variable and constant returns to scale over a period of nine years ranging from 2004–05 to 2012–13. The study used production approach to estimate efficiency scores of firms by using a non-parametric tool called the Data Envelopment Analysis (DEA). The results indicate that Rashtriya Gramin Vikas Nidhi Microfinance Limited (RGVN) and Share MACTS are the only two firms that lay on the efficiency frontier under variable returns to scale (VRS) approach whereas no firms were there in the efficiency frontier under constant returns to scale (CRS) approach. The nine-year average Technical Efficiency (TE) scores under both approaches remained the same at 0.889. Average Pure Technical Efficiency (PTE) score under input orientation is 0.916, whereas it is 0.921 under output orientation. Average Scale Efficiency (SE) scores were 0.971 and 0.966 under input orientation and output orientation, respectively.

Keywords: Microfinance Institutions, Data Envelopment Analysis, Technical Efficiency, Scale Efficiency.

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1. Introduction

Though India is the second largest country by population and seventh largest by size, banking still remains a distant dream for a vast number of people, especially in rural areas. For the comprehensive social and economical development of a nation, financial assistance needs to be extended to all the segments of a country. Though commercial banks have primarily been set up to lend a hand for the poor and unaddressed sectors of the economy, relatively higher interest rates and stringent norms for collateral securities impede the scope of the so called financial inclusion. Though the Reserve Bank of India (RBI) pushes banks to roll out their service in unprivileged areas too, the prevailing strong regulations and mandatory requirements force them to adhere to the conventional profit maximization theory.

In such a context, microfinance Institutions (MFIs) have got wider acceptance all over the world. Microfinance can be defined as “the provision of financial services such as savings, deposits, and credit services to the entrepreneurial poor” (Brandsma and Hart, 2001) From this definition it is clear that microfinance means the lending of small amount of loans at a low or nil interest rate and collateral securities, along with the acceptance of deposits and savings from the public. Hence, establishment of MFIs will have a positive repercussion on the economy since such firms are instrumental to combat financial exclusion, unemployment and economic stress affecting the poor people. The evolution of microfinance in India is delineated in Table 1.

Table 1: Evolution of Microfinance in India

Phase	Year	Features
<i>First Phase:</i> Social Banking	1960 -1990	<ul style="list-style-type: none"> > Nationalisation of commercial banks > Implementation of Lead Bank system > Expansion of banking services using RRBs, NABARD etc. > Extensive provision of subsidised loans
<i>Second Phase:</i> Financial Systems Approach	1990 - 2000	<ul style="list-style-type: none"> > Emergence of SHGs and SHG-Bank linkage programme > Emergence of NGO-MFIs
<i>Third Phase:</i> Financial Inclusion	2000 Onwards	<ul style="list-style-type: none"> > Commercialisation of microfinance > Development of non for profit MFIs like non-banking financial institutions (NBFIs) > Importance to client centric microfinance product > Heightened policy regulations

Majority of the MFIs have their roots in local areas. Hence, usually borrowers do not make any default in the repayment of loan amount and interest, if any, that they have availed. Thus it is clear that the fundamental objective of an MFI is social enhancement rather than reaping profit from the loans granted. Having said this, like any other institutions, MFIs also need money to run their business and meet their day-to-day needs. These contradictory views on MFIs accentuate the importance of institutionist paradigm and welfarist paradigm views. The former objective asserts the need for enough income in the hands of MFIs to meet the operational and financial costs while, the latter point elucidates the underlying objective of an MFI i.e., the establishment of a profound socio-economic balance to fulfill the needs of the unaddressed and marginalized sectors in the society. The success and outreach of an MFI thus depend upon its ability to balance these two primary objectives. The principle of 'survival of the fittest' is applicable in the case of MFIs also since it is a high risk venture. The widening of the scope of microfinance has brought in new players including Bank led MFIs in the sector, thus enhancing competition in the sector.

In this backdrop, this paper tries to examine the efficiency of NBFIs-MFIs using data envelopment analysis. The remaining sections of this paper is outlined as follows: section two deals with literature; section three deals with database and research methodology; data analysis and interpretations are included in section four and section five deals with conclusion and scope for future research.

2. Literature Review

Efficiency measurement in MFIs is essential as it gives vital information about the performance of the firm, especially on the use of resources and minimisation of wastes. It helps organisations to set targets for monitoring operations by the efficient management of bottlenecks and its barriers hindering the performance, and also helps the measurement, monitoring and improvements of outcomes leading to increased performance and profitability of the firm (Reynolds & Thompson, 2002). Berger and Humphrey (1997) stated that the main advantage of Data Envelopment Analysis (DEA) over parametric approaches to measure efficiency is that this technique can be used when the conventional cost and profit functions cannot be justified. Gutiérrez-Nieto, Serrano-Cinca and Mar-Molinero (2004) affirm that there are country effects on the efficiency; and effects that depend on non-governmental organisations (NGOs). Efficiency is an important attribute in any organization including MFIs in a number of reasons, first input resources (time, money, raw materials, machine, labour etc.) used by MFIs are scarce and limited since donors are unwilling to fund MFIs to the required capacity to serve all poor clients (Rosenberg, 1994). Transparent

pricing and technology implementation to maintain uniformity and efficiency are among the others which these institutions should adopt. Gutiérrez-Nieto et al. (2004) stated in their research report that the level of efficiency is dependent on the specifications chosen, and suggested that DEA is an appropriate tool for the assessment of MFI performance. Cooper, Seiford and Zhu (2008) declared that researchers in a number of fields quickly recognised that it was an excellent and easily used methodology for modelling operational processes for performance evaluations. African MFI employees are highly productive since the borrowers and savers per staff are high as a reflection of extensive group-lending approach (Lafourcade, Isren, Mwangi & Brown, 2005). As per the research conducted by Farrington (2000) accounting variables like expense ratio, number of loans per loan officer and loan officers to total staff, loan size, size of the portfolio, methodology adopted for lending sources of fund and structure of salary are the key drivers to achieve efficiency, hence they can be treated as measurement tools for the efficiency of MFIs. Gutiérrez-Nieto, Serrano-Cinca and Mar-Molinero (2007) had conducted a Data Envelopment Analysis to measure the efficiency of 30 Latin American MFIs. Their result showed that NGOs and NBFIs are most efficient. Further, productivity of an MFI can be gauged in terms of borrowers per staff member, and savers per staff member. Hence high level of MFI efficiency may be a result of keeping high productivity per employee level (Microbanking Bulletin, 2005). Hassan and Tufté (2001) stated that the female staff at Grameen Bank's branches work much more efficiently than the male staff at branches. The Grameen Bank follows the group-lending mechanism, which will help to increase the efficiency of staffs in MFIs (Lafourcade et al., 2005). Morduch (2000) reported rough estimate that only one percent of MFIs are currently financially self sustainable and no more than 5 percent ever would be. A study conducted by Cull *et al.* (2007) is one of the well done studies in the global microfinance industry. They used data from 124 MFIs from 49 developed countries and the results showed that the average financial self sufficiency (FSS) was found to be 1.035, whereas the operating self sufficiency (OSS) was 1.165. This means MFIs are becoming operationally self sufficient as compared to financial self sufficient. Besides, the adjusted ROA was negative (-0.027). The adjusted ROA indicates that most MFIs do not have a positive return on their investment. Depth of the outreach indicators such as average loan size per Gross National Income (GNI) per capita was 0.676, and the percentage of female borrowers were 64.9 percent. They found that the average interest rate was as high as 35 percent and gross loan portfolio to assets was 68.9 percent. Microfinance governance in Central and Eastern European region was studied by Hartarska (2004) and the findings were that the average ROA was 3.038, indicating the profitable MFIs in the region and the OSS was 91.99. Hulme and Mosley (1996) in a study observed that very few percent of MFIs were sustainable to run operations without

subsidies. The performance of Small Business Investment Companies (SBICs) between 1958 and 1996 was researched, and it highlighted the potential dangers of subsidised funding (Brewer *et al.*, 1996). A research conducted by Adongo and Stork (2005) in Namibia found that microfinance was instrumental in promoting the sustainability of micro enterprises to the extent that it created an improvement in the management of their financial services. A study done by Gulli (1998) suggested that the institutions must charge sufficient interest rates so as to cover up their costs in order to ensure self sufficiency. As per the research conducted by Haq, Skully and Pathan (2010), many Indian MFIs reduce their staffing cost by lending to SHGs rather than to the Individual borrower. Mahajan and Nagasri (2010) stated that stringent legal and regulatory framework was a whip for MFIs, which hinder them from working freely, but economical and operational sustainability were the main aims of government. Jacob (2011) affirmed that inability of MFIs in getting sufficient funds was a major hindrance in the microfinance growth and so these institutions should look for alternative sources of funds.

3. Database and Research Methodology

The sample for the study was retrieved from the MIX market database on a structured basis³. As per this database the entire MFIs in India have been segmented into four groups, viz., banks, cooperatives, NBFIs, NGOs and others. The total database consisted of 900 records of MFIs, having a diamond ranking from 1 to 5. In this context an MFI with rank '1' means low disclosure and one with rank '5' means high disclosure. Of the 900 records (from 1999 to 2013) 417 records pertain to NBFIs-MFIs. Of 417 records, the researchers have sorted the data on the basis of the age of the firm. As per the MIX market database, MFIs have been segmented in to three categories on the basis of their 'age': i) New (one to four years of existence), ii) Young (five to eight years of existence) and iii) Mature (more than eight years of existence).

In this case, the sample has been driven down to matured firms only, and that comes to 191. All the NBFIs that have a disclosure level of 3 and above (diamond ranks) were taken which accounted to 177 MFIs. The next stage was to ensure the availability of data for the entire period of the study. The researchers had two options, (1) to go ahead with an imbalance panel data or (2) to go with a balanced

³ MIX is the acronym of Microfinance Information Exchange, a non-profit organization headquartered in Washington D.C. The organization engages in rendering the service of disseminating business information regarding microfinance sector worldwide. The organization was founded by Consultative Group to Assist the Poor (CGAP) and funded by the Bill and Melinda Gates Foundation, Citi Foundation, CGAP, Deutsche Bank Foundation, International Fund for Agricultural Development (IFAD) and Omidyar Network.

panel data. In this paper, the second option was chosen and the final sample consisted of nine NBFIs-MFIs. These include BASIX, BSS Microfinance Pvt. Ltd., Evangelical Social Action Forum (ESAF) Microfinance and Investment (P) Ltd., Grama Vidiyal Microfinance Ltd., Rashtriya Gramin Vikas Nidhi Microfinance Ltd., Sarvodaya Nano Finance Limited, Satin Creditcare Network Limited, Share Mutually Aided Co-operative Thrift Society Limited (Share MACTS) and Swayam Krishi Sangam Microfinance Limited (SKS). In practice, there are two approaches to determine the efficiency of the firm; parametric and non-parametric approach. The former requires a specific pre-defined functions form of cost or production as it is based on the underlying relationship between the parameters under the study and the various observed independent variable. The latter approach does not require any pre-specified function as it is based on the optimising behaviour of the firm under the study. It takes data of actual operations of the firms under the study and a frontier is formed as piecewise linear combination of the 'most efficient' observations. Thus efficiency is relative to the 'observed best' rather than an absolute value.

3.1 Relationship between Input, Output and Efficiency

Farrell (1957) proposed an approach to estimate the efficiency (E) of the units observed and decomposed efficiency into two parts namely (a) technical efficiency and (b) allocative efficiency (AE). The former measures the success of a firm in producing maximum output with a given set of input and the latter measures the success of a firm in choosing the best possible combination of inputs, given their respective prices.

Figure 1: TE and AE under Input-Orientation

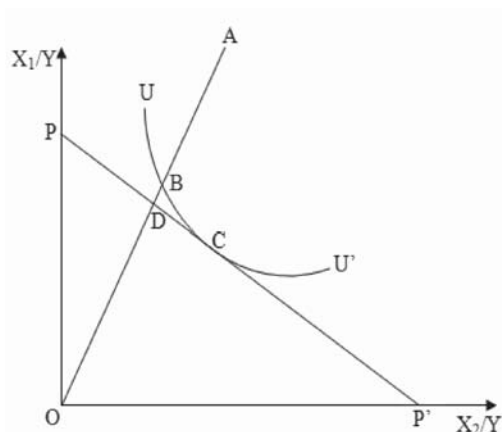
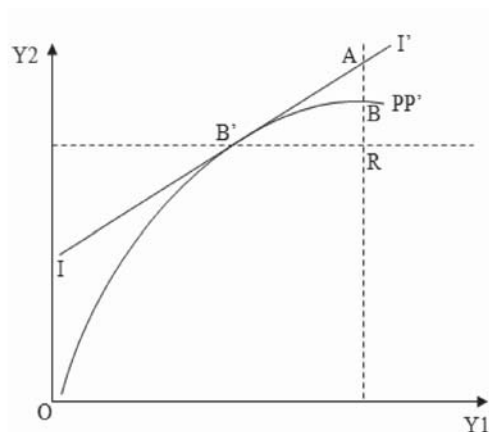


Figure 2: TE and AE under Output-Orientation



This is explained in figure 1 with an assumption that output is produced by two sets of inputs, viz., X_1 and X_2 . The curve UU' is an output isoquant representing different combinations of output that can be produced by employing these two inputs. Line PP' is the cost minimization curve. Hence, the overall efficiency of the firm is OD/OA and technical efficiency (TE) is measured as OB/OA and allocative efficiency (AE) as OD/OB . In simple words, efficiency can be computed as a product of technical efficiency and allocative efficiency ($E = TE * AE$). Figure 2 explains the technical and allocative efficiencies from output-orientation. The output-orientation method mainly focuses on the changes in output by consuming a fixed level of inputs. In the diagram PP' is the production function (output/input). The PP' line reflects a technically efficient production practice, and hence all firms operating at PP' are fully technically efficient i.e., 100% technically efficient. A firm is observed to be operating at R by using the same amount of inputs as used by an efficient firm operating at B. Since the latter firm produces more output than the former firm with the same amount of inputs, the technical efficiency of the former firm will be the ratio of the distance (OR to OB) i.e. ($TE = OR/OB$). An iso-profit line (II') is drawn through the points A and B' and the firm functioning at point B' is producing the best combination of output but it is not the optimal one. Firm B' can increase the level of output (B-A) without changing its input. Thus allocative efficiency in output-oriented approach is the ratio between OB and OA i.e. ($AE = OB/OA$). Therefore in output-oriented approach, efficiency can be calculated as the product of technical efficiency and allocative efficiency [$E = TE * AE$].

Data Envelopment Analysis (DEA), a non-parametric approach was used in this study to analyze the technical efficiency of select NBFIs-MFI in India. DEA helps to calculate the relative efficiency score of various decision making units (DMUs) in a particular sample and in this case the DMUs are NBFIs-MFIs in India. Both input oriented and output oriented approach have been applied in this study and the results given are computed using Data Envelopment Analysis Online Software [DEAOS (www.deaos.com)].

Input oriented approach is used to get the required level of output with minimum input (input minimization) and an output oriented model helps to compute the technical efficiency by output of a firm in relation to the best-practice level of output for a given set of inputs. The main objective of this study is to analyze technical efficiency of NBFIs-MFIs using production approach by taking two input and output variables. One main parameter adopted for the selection of these variables is the frequency of their usage in the studies relating to the efficiency of MFIs. Hence the input variables used (capital x_1) and personnel (x_2) and output variables were gross loan portfolio (y_1) taken as an indicator for outreach and borrowers per staff (y_2) indicating the coverage by an MFI within

the given set of resources in order to meet the credit needs of the target group. These variables have been used in many studies for gauging the efficiency of MFIs. Ahmad (2001), Annim (2010), Masood and Ahmad (2010), Haq (2010), Gutiérrez-Nieto, Serrano-Cinca and Mar-Molinero (2009), Bassem (2008), Hermes *et al.* (2009), and Hassan and Sanchez (2009) have used these techniques to measure the efficiency of MFIs.

4. Data Analysis and Interpretation

Technical efficiency for all nine NBFI–MFIs have been calculated using DEA by assuming both constant returns to scale and variable returns to scale technology. While computing technical efficiency of DMUs, input oriented and output oriented approach was adopted and the results are summarized in Table 2.

Table 2: Technical Efficiency of MFI during 2004-05

NBFI-MFI	Input Orientation			Output Orientation		
	TE	PTE	SE	TE	PTE	SE
BASIX	0.960	0.960	1.000	0.960	0.960	1.000
BSS	1.000	1.000	1.000	1.000	1.000	1.000
ESAF	0.800	0.820	0.976	0.800	0.810	0.988
Grama Vidiyal Microfinance Ltd	0.620	0.630	0.984	0.620	0.670	0.925
RGVN	1.000	1.000	1.000	1.000	1.000	1.000
Sarvodaya Nano Finance	0.890	0.890	1.000	0.890	0.890	1.000
SCNL	1.000	1.000	1.000	1.000	1.000	1.000
Share MACTS	1.000	1.000	1.000	1.000	1.000	1.000
SKS	1.000	1.000	1.000	1.000	1.000	1.000
Mean	0.919	0.922	0.996	0.919	0.926	0.993

The results indicate 55.50% (i.e., five NBFI–MFIs out of nine) are technically efficient both under CRS and VRS approaches. These include BSS, RGVN, SCNL, SHARE and SKS which are mainly into micro financing activities. The average input-oriented technical efficiency (TE), pure technical efficiency (PTE) and scale efficiency (SE) for the year 2004–05 are 91.9%, 92.2% and 99.6%. Averages of TE, PTE and SE for output oriented approach are 91.9%, 92.6% and 99.3%. In a nut shell it can be said that all the NBFI–MFIs under input oriented approach are fairly efficient and can further reduce the level of input by 7.8% for the given level of output. Under output oriented approach, the results are also quite attractive and the NBFI–MFIs can further increase their outputs by 7.4% with existing level of resources by efficient allocation of inputs namely total assets

and personnel. In a similar manner, technical efficiency for all years has been computed (2005-2013) and the average efficiency of all the years are depicted in Table 3.

Table 3: Average Technical Efficiency Scores for NBFI-MFIs (2005-13)

NBFI-MFI	Input Orientation			Output Orientation		
	TE	PTE	SE	TE	PTE	SE
BASIX	0.816	0.829	0.984	0.816	0.840	0.971
BSS	0.927	0.943	0.983	0.927	0.943	0.983
ESAF	0.854	0.871	0.980	0.854	0.870	0.982
GVM	0.802	0.809	0.991	0.802	0.857	0.936
RGVN	0.981	1.000	0.981	0.981	1.000	0.981
Sarvodaya	0.956	0.961	0.995	0.956	0.961	0.995
SCNL	0.826	0.856	0.965	0.826	0.841	0.982
Share MACTS	0.954	1.000	0.954	0.954	1.000	0.954
SKS	0.883	0.974	0.907	0.883	0.974	0.907
Mean	0.889	0.916	0.971	0.889	0.921	0.966

The results indicate that none of the NBFI-MFIs are technically efficient when CRS is assumed under input orientation, whereas two out of nine NBFI-MFIs are efficient when VRS is assumed. The two NBFI-MFIs are RGVN and SHARE whose primary activities accounted in the microfinance area. The average input oriented TE, PTE and SE scores are 88.9%, 91.6% and 97.1% which are more or less equal to the same under output oriented measures, which stood at 88.9% (TE), 92.1% (PTE) and 96.6% (SE). In the input oriented measure, the NBFI-MFIs can reduce 8.4% of their inputs without affecting the existing level of outputs and in the output oriented measure can increase 7.9% of their outputs namely Gross Loan Portfolio and Borrowers per staff member without changing the existing level of inputs.

5. Conclusion

The study analyzed the technical efficiency of nine NBFI-MFIs during the period 2005 to 2013. Both input oriented and output oriented measures were adopted in this study. None of the NBFI-MFIs remained fully efficient under both measures, but under variable returns to scale, RGVN and SHARE remained in efficiency

frontier, both under input and output oriented measures. The average technical efficiency under constant returns to scale (TE), technical efficiency under variable returns to scale (PTE) and scale efficiency (SE) under input oriented measures are 88.9%, 91.6% and 97.1%, which are more or less equal to the scores under output oriented measures of 88.9% (TE), 92.1% (PTE) and 96.6% (SE). The efficiency so calculated is directly related to the inputs selected. Hence, using other inputs may result in different efficiency scores. Future studies can be aimed at analysing the efficiency of MFIs by incorporating all the players according to their legal status as listed in the MIX market database namely NGOs, cooperatives, banks etc. by taking different input and output combinations.

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